Kansas City Area Teachers of Mathematics
2013 KCATM Math Contest

MATHLETICS

GRADE 6

INSTRUCTIONS

- **WRITE YOUR TEAM NUMBER AND SCHOOL NAME ON THE LINE PROVIDED ON EACH SHEET EACH TIME YOU BEGIN A NEW PROBLEM.**
- **Do NOT turn this page** until instructed to do so.
- **WRITE YOUR TEAM NUMBER AND THE ANSWER ON EACH BACK PAGE. This will be checked and recorded for each problem.**
- You **may use calculators** on this test.
- ***Scratch paper can be used*.** Do **NOT** write on the team number card!
- Use the π **key** on your calculator **or 3.14159** as the approximation for pi.
- You **may not use rulers, protractors, or other measurement devices** on this test.

Many problems came from or adapted from:
Problem Solving Strategies for Efficient and Elegant Solutions, Alfred Posamentier & Stephen Krulik, Corwin Press, 2008

Team Number: _____ School: _____

Team Members: _____

_____

_____

Problem 1 **3 points**
3 minutes

A local pet store owner just bought her holiday supply of baby chickens and baby rabbits. She doesn't really remember how many of each she bought, but she has a system. She knows that she bought a total of 22 animals, a number exactly equal to her age. Furthermore, she also recalls that the animals had a total of 56 legs, her mother's age. How many chickens and how many rabbits did she buy?

Answers:

Chickens = _____

Rabbits = _____

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Problem # 2

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 2 **2 points**
2 minutes

A sledding hill is 160 feet long. You start at the top at a rate of 3mph. Every 20 feet, your speed increases by 10%. What is your speed at the bottom of the hill? Round your answer to the nearest hundredth mph.

Answer:_____

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Problem # 3

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 3 **1 point**
1 minute

If the interior of the rectangular planter shown measures 48" x 24" and 18" tall. Dirt is sold by the cubic yard. Garden soil is priced at $34 per cu. yard delivered from Acme Soil Company. What is the cost of the dirt that would fill fourteen planters for a park?

Round your answer to the nearest whole dollar.

Answer:_____

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Problem # 4

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 4 **2 points**
2 minutes

The letters A, B, C, D, and E have whole number values 1 through 5. Find the value of each letter using the equations and table below.

1. B – D = E
2. C + D = A + E
3. B + 1 = C

	A	B	C	D	E
1					
2					
3					
4					
5					

Answers: A = _____

B = _____

C = _____

D = _____

E = _____

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Problem # 5

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 5 - Hoop Stars

3 points
3 minutes

Player A	Player B	Player C	Player D	Player E
9	14	19	15	13
10	16	18	17	12
12	16	16	19	13
13	13	14	17	12
11	16	18	17	15

Daniel, Kirk, Josh, Michael, and Roger often play a half-hour-long game of basketball. They keep track of the number of points each player has earned each game. The scores are listed above.

- The mean of both Daniel's and Kirk's scores is 17.
- The median of Michael's scores is 3 less than the median of Josh's scores.
- The mean of Roger's scores is less than the mean of any other player's scores. There is no mode of Roger's scores.
- The mode of Daniel's scores is 1 more than the mode of Kirk's scores.
- There is one player whose scores yield 2 modes.

Which scores belong to which player?

Answers:

Daniel: Player ___

Kirk: Player ___

Josh: Player ___

Michael: Player ___

Roger: Player ___

School _____ TEAM # _____

http://www.eduplace.com/kids/mhm/brain/gr4/index.html

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Problem # 6

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 6 **1 point**
1 minute

Find the smallest integer value for x

$$\frac{12}{x+1}$$

for which yields an integer.

Answer:_____

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Problem # 7

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 7 **2 points**
2 minutes

What is the sum of the values in the 25th row of the following array?
(Hint: Look for a pattern in your table of values.)

Row 1						1					
Row 2					3		5				
Row 3				7		9		11			
Row 4			13		15		17		19		
Row 5		21		23		25		27		29	
Row 6	31		33		35		37		39		41

Row	Total
1	
2	
3	
4	
5	
6	
n	

Answer:_____

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Problem # 8

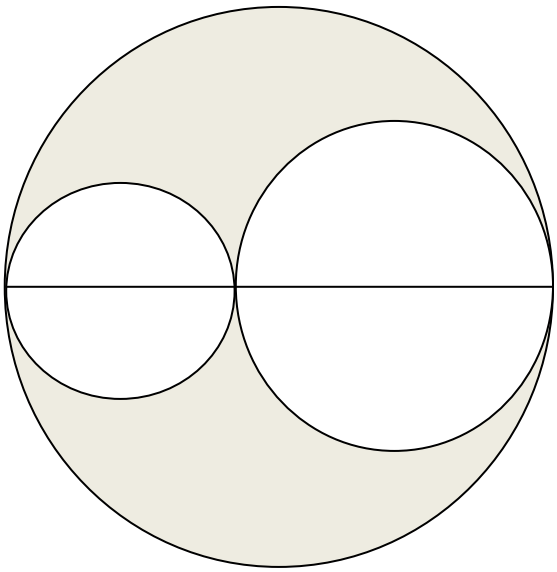
Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 8 **3 points**
3 minutes

The diameter of the small circle is 2 in. and the medium-sized circle has a diameter of 3 in.

Find the ratio of the area of the shaded region to the area of the largest circle. $A = \pi r^2$ *(You may use π on calculator or 3.14159)*



Answer: _____

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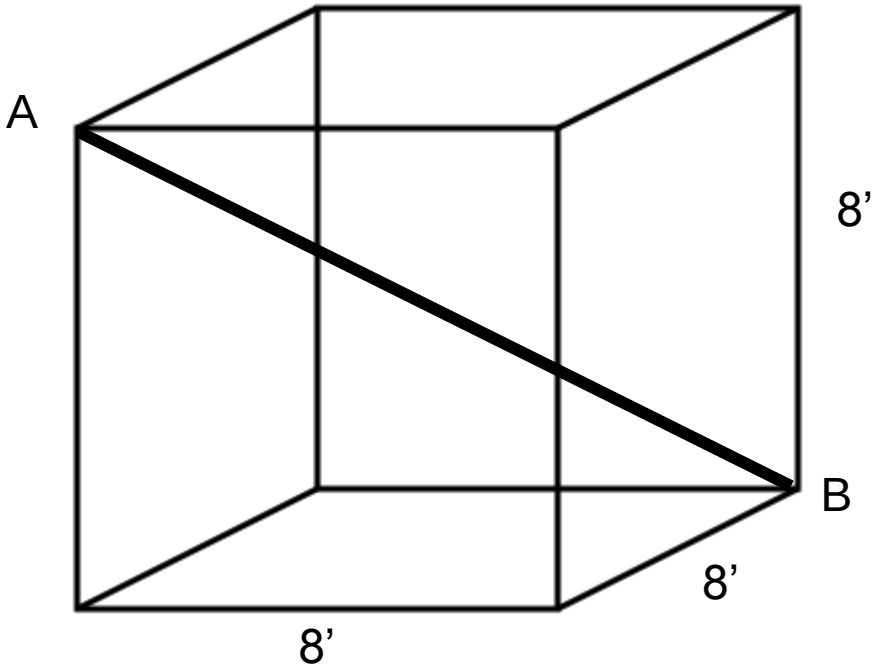
Problem # 9

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 9 **3 points**
3 minutes

What is the length of the diagonal of a cube-shaped room with walls, floor and ceiling measuring 8 feet (length, width, and height)? Round your answer to the nearest tenth of a foot.



Answer:_____ft.

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Problem # 10

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Team Number: _____ School: _____

Problem 10 **2 points**
2 minutes

There are three integer solutions for the value of *x* in the following equation. Find at least two of them.

$$(3x+7)^{(x^2-9)} = 1$$

Answer:_____ and _____

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Problem # 11

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 11 **1 point**
1 minute

Simplify:

$$\frac{5!(3!)}{6!}$$

Answer:_____

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Problem # 12

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 12 **3 points**
3 minutes

A cat chases a mouse, which has a 160 meter head start.
For every 7m the mouse runs, the cat runs 9m.
How far must the cat run to catch the mouse?

Answer:_____meters

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Problem # 13

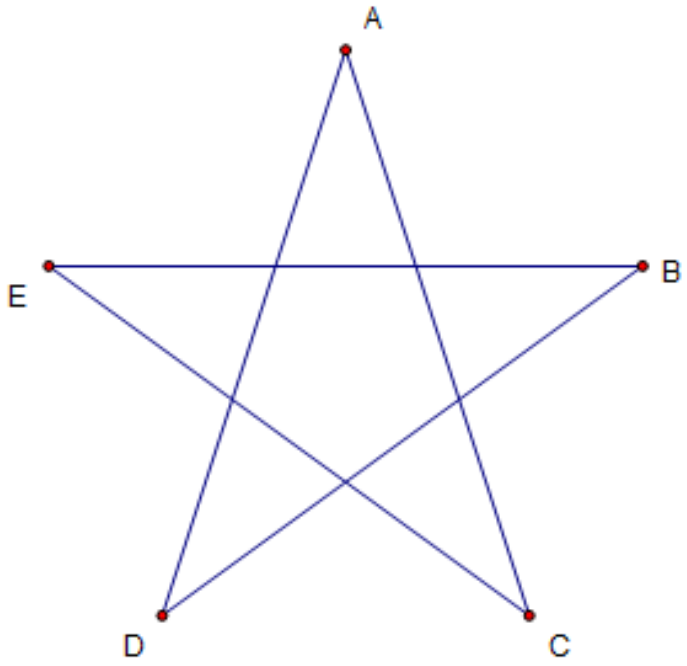
Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 13

2 points
2 minutes

Given a regular pentagram, find the angle measure at each of the congruent vertices A, B, C, D, and E.



Answer:_____°

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Problem # 14

Do NOT turn the page until you are told to do so.

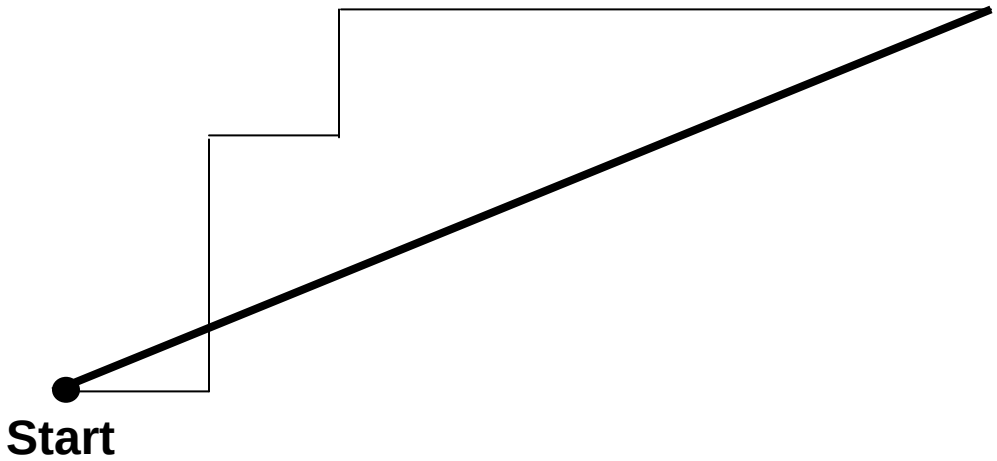
Team Number: _____ School: _____

Problem 14 **3 points**
3 minutes

You leave school Olathe East HS and travel 1 mile east to Pflumm Road, then north 2 miles on Plfumm to College Blvd. You then turn east 1 mile until reaching Quivira, at which time you turn north 1 mile to Interstate I-435. You head east on I-435 for 4 miles.

If you had a futuristic vehicle that could have taken you on a direct route to your location, how much distance would have saved? Round your answer to the nearest tenth of a mile.

http://www.tuvie.com/a350h-airliner-features-vertical-takeoff/



Answer:_____ miles

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Problem # 15

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 15 **2 points**
2 minutes

Given that $\frac{1}{8}$ of a number is $\frac{1}{5}$, what is $\frac{5}{8}$ of that number?

Answer:_____

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Problem # 16

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 16 **2 points**
2 minutes

Four married couples belong to a theater club. The wives' names are Alice, Barbara, Christa, and Edith. The husband's names are Al, Frank, Fred, and Ernest. Who is married to whom?

1. Al is Edith's brother.
2. Edith and Fred were once engaged, but broke up when Edith met her present husband.
3. Christa has a sister, but her husband is an only child.
4. Alice is married to Ernest.

	Alice	**Barbara**	**Christa**	**Edith**
Al				
Frank				
Fred				
Ernest				

Answers:

Al is married to:_____

Frank is married to: _____

Fred is married to: _____

Ernest is married to: _____

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Problem # 17

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 17 **3 points**
3 minutes

What is the sum of the consecutive integers from 23 to 227?

Answer:_____

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ANSWER KEY

Answers:

1. **16 chickens and 6 rabbits**
2. **6.43 mph**
3. **$212**
4. **A=5; B=3; C=4; D=2; E=1**
5. *See figure on right.*
6. **-13**
7. **25^3 =**
8. **12/25 or 12:25; other options:** 9.425:19.625, or 48:100
9. **13.9**
10. **3, -3, and -2**
11. **1**
12. **720 meters**
    The cat gains 2 meters for every 9 meter intervals. To catch up with the mouse, the cat must run 160/2 or 80 intervals. 80 x 9 = 720 meters
13. **36^o**
    (5-2)180 = 540; 540/5 = 108^o; Supp = 72^o
    as base angles of an isosceles triangle.
    180 – (2 x 72) = 180-144 = 36^o
14. **2.3**
    9 - $\sqrt{45}$ =
15. **1**
16. **Al is married to Barbara**
    Frank is married to Edith
    Fred is married to Christa
    Ernest is married to Alice (given)
17. **25,625**
    23 + 24 + 25 + …226 + 227 102 pairs of (24+227) = (25+226)
    23 + 102(251) = 25,625

Hoop Stars

Solution

Player A is Roger.
Player B is Josh.
Player C is Daniel.
Player D is Kirk.
Player E is Michael.

Explanation

	Player A	Player B	Player C	Player D	Player E
Scores from least to greatest	9 10 11 12 13	13 14 16 16 16	14 16 18 18 19	15 17 17 17 19	12 12 13 13 15
Sum of scores	55	75	85	85	65
Mean	11	15	17	17	13
Median	11	16	18	17	13
Mode	none	16	18	17	12, 13
Name of Player	Roger	Josh	Daniel	Kirk	Michael